EXHIBIT A

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# Ball Grid Array Technology

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**snap-off distance** The screen printer distance setting between the bottom of the screen and the top of the substrate.

**soak time** The length of time a ceramic material, for example, a substrate or thick-film composition, is held at the peak temperature of the firing cycle.

**socket contact** A female contact designed to receive and mate with a male contact. It is normally connected to the live side of a circuit.

**soft error** A memory state error induced by a process which produces no permanent alteration of the physical condition of the memory device. Soft errors can be created by alpha particles passing through the device.

**soft glass** Glasses, typical high-lead content glasses, having a low softening points that could be used to seal ceramic or metal lids to packages below about 450C. Also called solder glasses because of their ability to wet most metal surfaces.

**softening point** Refers to the temperature at which the log viscosity of glass is 7.6 poises, as defined and measured to ASTM specification.

**solder** A low melting point alloy, usually of lead(Pb)-tin(Sn), that can wet copper, conduct current, and mechanically join conductors and so on.

**solder balls** Small spheres of solder adhering to laminate, mask, or conductor surfaces (generally after wave or reflow soldering).

**solder bumps** The round solder balls bonded to a transistor contact area and used to make connection to a conductor by face-down bonding techniques.

**solder coat** A layer of solder applied directly to the printed board conductive path from a molten solder bath.

**solder column package** Devised by IBM, this first level package looks identical to a ceramic pin grid array package. However, instead of hard metal pins, the input/output terminals consist of columns of solder up to 0.150" long. The package is surface mounted to a printed circuit board by reflowing a selected amount of solder around the base of the columns. The long solder columns provide stress relief between the ceramic package and the board. It is designed for large ceramic chip carriers (e.g., 35 mm to 64 mm on a side).

**solder connection** An electrical/mechanical connection that employs solder for the joining of two or more metal parts.

**solder cup terminal** A metallic termination device that has a hollow, cylindrical feature, open on one end, to accommodate the soldering of one or more leads or wires.

**solder dam** A dielectric composition screened across a conductor to keep molten solder from spreading further onto solderable conductors.

**solder eye** A solder-type terminal provided with a hole at its end through which a wire can be inserted prior to being soldered.

**solder fillet** A blended or meniscoid (rounded) configuration of solder around a component or wire lead and land.

**solder hierarchy** In a complex package assembly, some components have to be assembled (soldered) before others, so these usually utilize a higher melting point solder than later assembled components. Ideally, if the assembly is soldered to a board, the board connection is made with the lowest melting point solder so that previous solder joints are not reflowed or negatively affected by the last joining process.



**solder leveling** A solder coating process in which heated gas or other media level and remove excess solder after the substrate is dipped in molten solder.

**Solid Logic Technology (SLT)** Ceramic package technology practiced by IBM in the 1960s by firing AgPd conductors onto dry-pressed and fired alumina substrate.

**solder mask coating** See **resist.**

**solder plugs** Cores of solder in the plated-through holes of a printed board.

**solder projection** An undesirable protrusion of solder from a solidified solder joint or coating. Also called *icicle.*

**solder side** On boards with components on one side only, the side of a printed board that is opposite the component side.

**solder webbing** A continuous film or curtain of solder that is parallel to, but does not necessarily adhere to, a surface pattern, or that is between separate conductive patterns that should be free of solder.

**solder wicking** The capillary rise of solder between individual strands of stranded wire.

**solderability** The ability of a conductor to be wetted by solder and to form a strong bond with the solder.

**soldering** A process of joining metallic surfaces with solder, without melting the base material.

**soldering flux** See **flux.**

**soldering oil (blanket)** Liquid formulations used in oil-intermix wave soldering equipment. Also used as pot coverings on still and wave solder pots to eliminate dross and reduce solder surface tension.

**solderless wrap** See **wire wrap.**

**solid state** Pertaining to circuits and components using semiconductors as substrates.

**space transformer** A package transforming a spatially dense set of chip connections to a less dense set of connection points on the next level package.

**specific mesh registration** A mask or screen in which the mesh holes are carefully aligned to correspond with the apertures of the stencil cavity.

**spice** A simulation program for integrated circuit analysis that is the industry standard for circuit simulation.

**spinning** A process for coating a smooth surface with a uniform film. Usually used to coat a semiconductor wafer with a photosensitive emulsion by placing the wafer on a rotating chuck and dropping the emulsion on the surface. The combination of centrifugal acceleration and adhesion of the liquid forms a uniform film of emulsion on the surface. Also used to provide thin coatings (for example, of polyimide dielectric) on package elements.